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Reconciling Progress with Ecology

A new national consciousness flourished during the late 1960s, introducing the most recent major dimension to the work of the army engineers. An awakening, as it were, to the environment so long taken for granted, this awareness was a logical outgrowth of the country's development. Years earlier, our founding fathers took stock of America's seemingly unlimited natural resources and embarked upon a nonstop course toward economic growth and prosperity. From then on, the cause of progress enjoyed unquestioned national priority.

Gradually, populations multiplied and sprawling metropolitan areas appropriated the landscape. The precarious partnership between man and his milieu deteriorated. In exploiting the assets of nature, man too often abused them with casual abandon. Finally, a concern for ecology arose, replacing the long-standing preoccupation with progress at any price.

Natural phenomena have supplied the raison d'etre for many civil works undertaken by the army engineers — river channels to be deepened, flood waters to be subdued, storms to be protected against, and uncontrolled energy to be harnessed into the service of mankind. But where Congress had formerly directed the Corps to utilize natural resources in pursuit of progress and safety, a new mandate would add restraints aimed at restoring and preserving ecological balance.

New Life for an Old Law

Growing demands to conserve natural resources culminated in the National Environmental Policy Act of 1969. Implemented in 1970, this legislation affected a host of well-established practices. To the Corps of Engineers, it brought further broadening of activities, expanded responsibilities and powers, and increased coordination with agencies responsible for fish and wildlife, water quality, recreation, agriculture, and public health.[1]

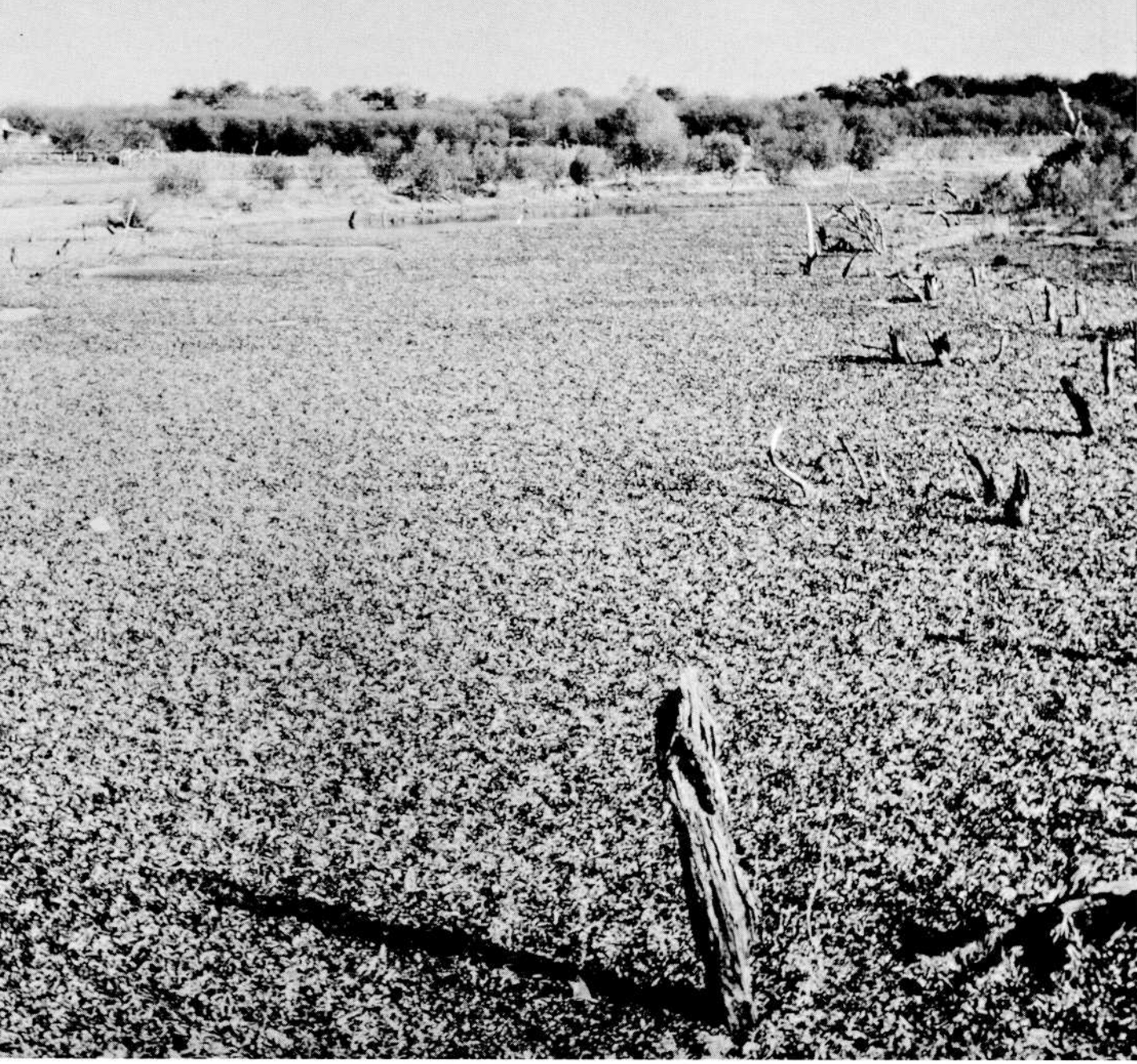
Although the Corps has been much maligned as the villain in recent environmental disputes, the historical record reveals some evidence to contradict its culpability. Indeed, the interest of the early engineers in natural resources may well be dated back to their systematic attempts to collect and classify flora and fauna during the topographical expeditions.

With their traditional responsibility for navigable waters steadily growing, the army engineers were among the first to champion the waterways during the last quarter of the nineteenth century.

The Corps was instrumental in drafting the pioneering legislation to provide protection against water pollution. The Rivers and Harbors Act of March 3, 1899 gave army engineers jurisdiction over all navigable waters and defined regulatory powers to defend the integrity of national waterways. Section 13, known as the "Refuse Act," forbade the depositing of "any refuse matter of any kind or description whatever" into these waters. More than a half century would pass, however, before the full extent of the far-reaching powers implicit in this act would become realized. A victim of narrow interpretation, the law was construed to cover only situations directly affecting navigation: structures could be built, alterations could be made, and materials could be dumped in the waterways unless they could be demonstrated to be detrimental to navigation. The burden of proof fell upon the Corps of Engineers.[2]

Collecting the evidence was not always enough. Clear-cut violations, such as the dumping of rice hulls into the Sabine River by a rice mill near Orange during the 1930s, could be readily shown and the offending practices halted. But more often as the years passed, water samples containing effluents or suspended particles were rejected as insufficient proof that industrial waste discharges were causing "solid" obstruction or excessive shoaling in the channels, and the violators were not prosecuted. Not until 1960 was the 1899 law given a more liberal interpretation, in keeping with the needs of the times. During the past decade and a half, this law has grown from an antipollution measure to a sweeping program of environmental control.[3]

The permit program sanctioned in section 10 of the 1899 law, as developed and administered by the Corps of Engineers, has safeguarded navigable waters for commercial purposes and has furnished a model for the environmental permit program developed in response to the conservation thrust of the 1960s. Enforcement powers under the Refuse Act to protect water quality were added late in 1970, when the Corps was directed to require permits for all discharges into navigable waters with the explicit objective of halting pollution of the waterways. This function was conducted by the Corps until it was transferred to the Environmental Protection Agency by the Federal Water Pollution Control Act Amendments of 1972 (FWPCA). The most recent change in the permit program, a broadened interpretation of section 404 of the FWPCA, greatly expands Corps regulatory jurisdiction over disposal of dredged and fill material to include not only the "navigable" waterways historically under Corps control, but also adjacent wetlands, tributaries, and headwaters.[4]



Water hyacinth in winter blankets impounded waters in South Texas.

A totally different evil began threatening the waterways about the time the Refuse Act was enacted. The water hyacinth *(Eichhornia crassipes)*, a showy floating plant similar to the water lily, was reputedly introduced in the United States as an ornamental at the New Orleans Cotton Exposition in 1884. Evading the confines of cultivation, this aquatic herb gradually invaded the waters of the states along the Gulf. By 1900, it had become firmly entrenched. Problems noted during 1904 in the Calcasieu, Sabine, and Neches rivers were sufficiently great to generate legislation providing for a steamboat, the *Hyacinth,* to destroy the unwelcome agent in the streams of southwest Louisiana and southeast Texas.[5]

On August 9, 1907, water hyacinths were first noticed in Buffalo Bayou.

> An allotment of $500 was made on November 4, 1907, to destroy the hyacinths and prevent their becoming an obstruction to navigation. As they were scattered in small bunches, it was deemed impracticable to spray with arsenic and soda solution, so men were employed to gather them up in boats and place them on high ground, where they dried up and died. Two men with boats and launch have been employed by the city of Houston, Tex., since February 1, 1908, on this work and have practically cleared the bayou except for a few scattered bunches in marshes and high grass below Lynchburg, Tex. This work has been supervised by the United States Engineer Department, at a cost of $35.26.[6]

Although increased salinity, shipping activity, and concentrated pollution eventually accomplished eradication in the Houston Ship Channel, the obstinate weed continued to thrive and spread through the inland waterways across Texas.

The prolific hyacinth covers the water surface with a dense mat, capable of doubling in area every month of the growing season. Congesting or completely blanketing natural streams and drainage canals, the hyacinths adversely affect most aquatic benefits: the impenetrable growth blocks navigation, reduces discharge capacity for drainage and flood control, and restricts movement of fish; depleted oxygen content in the water and occlusion of sunlight by the broad, ovate leaves further disrupt fish and wildlife ecology, undermining basic food production and rendering the waters unsuitable for spawning purposes; finally, the plant infestations foster breeding of disease-carrying mosquitoes and preclude most swimming, boating, and fishing.[7]

Complete eradication has proved virtually impossible. Over the past seventy years, methods of controlling obnoxious aquatic plants have evolved from mechanical means such as log booms, harvesters, crushers, and saw-boats to more sophisticated chemical and biological techniques. The Corps of Engineers has undertaken research to develop safe and improved techniques to free the nation's waterways from the damaging plants. To date, a herbicide has been most effective in combatting the water hyacinth; alligator weed *(Alternanthera philoxeroides)*, a vinelike plant that tends to follow hard on the heels of the hyacinth, has responded to biological treatment with the *Agasicles* flea beetle.[8]

The Galveston District is responsible for obnoxious aquatic plant control throughout the entire state. Except for Caddo Lake in northeast

Dense mat of alligator weed on Neches River, 1970s

Texas, most infested areas lie within 200 miles of the coast. A program to eliminate water hyacinth and alligator weed was begun in 1970 in cooperation with the Texas Parks and Wildlife Department.[9] Growths of Eurasian water milfoil and hydrilla suggest potential problems that may need to be tackled in the future.

Maximizing Natural Resources

Dredging, a long-standing Corps function, has borne the brunt of much environmental criticism; in fact, this activity has proved serendipitous. Deposits of material removed from the channels have, in some instances, built up artificial islands on which marsh vegetation, capable of supporting wildlife, becomes established. A prime case in point is Brown Pelican Island in Corpus Christi Bay, where the brown pelican, an endangered species, has found sanctuary. The Galveston District controls deposition of dredged material on a seasonal basis in deference to breeding patterns of these birds. Similarly, dredging is curtailed on the Channel to Victoria so as not to disturb the winter habitat of the rare southern bald eagle. Examples of environmental enhancement afforded by the disposal islands lie all along the Gulf Intracoastal Waterway, where excavated material has created nesting grounds for roseate spoonbills, black skimmers, royal terns, great blue herons, and many other bird species. Oysters, shrimp, crabs, and other fish abound in the surrounding waters.[10]

Seeking to capitalize on the environmental advantages of dredged material, the Corps of Engineers has initiated a national research program to develop improved disposal techniques that will produce nutrient-

Black skimmers in West Galveston Bay. Galveston Causeway in background, 1970s

Bitter panicum grass covers barrier dune on Padre Island, September, 1974.

rich breeding and feeding grounds for marine life and waterfowl. In 1975, the Galveston District in cooperation with the Corps Waterways Experiment Station began a three-year program using dredged matter to create a 17-acre experimental marsh on Bolivar Peninsula, alongside the intracoastal waterway. Once constructed and graded, the area will be seeded and sprigged with several types of grass. Marsh productivity, marine life and plant growth, and wildlife attracted to the marshland will be studied over a two-year period.[11]

In an attempt to achieve engineering stability using natural materials, the district began a pilot project on San Jose Island in 1974. To counteract the persistent problem of wind erosion that has plagued this barrier island, a levee, 4,500 feet long by 1,400 feet wide, was constructed and planted with bitter panicum grass. This vegetation is expected to prevent sand displacement, reduce erosion, and preserve slope integrity.

Still other Corps projects, not originally devised for their environmental value, have yielded significant ecological and recreational dividends. The Texas City Dike, authorized as a pile construction in the 1913 navigation project and replaced in its present rubble-mound form between 1931 and 1934, has been a tremendous boon to recreation.[12] The Galveston groins, built in the 1930s to prevent beach erosion and protect the seawall, have further enriched recreational resources, furnishing easily accessible fishing areas and a haven for small fish and crustaceans. Quite incidentally, such structures increase the number of habitats conducive to marine life.

Rehabilitation of Galveston groins, 1969

Beach erosion has long commanded the Galveston District's attention. At first, federal interest in this problem was limited to protection of federal property and improvements for navigation. After 1930, it grew to encompass not only federally owned property, but also publicly owned shores and, eventually, even private property when the protection would result in public benefits.[13]

Until recently, when beach erosion acquired greater prominence in the light of widespread conservation concern, the Galveston groin system was the district's sole beach erosion project. Now, operations move along on a new and different project, authorized to replenish North Beach on Corpus Christi Bay. In 1868, this beach shoreline extended bayward as much as several hundred feet. Relatively steady regression has occurred since 1882, reducing the 1.4-mile-long beach to an average width of 20 feet. As the beach gradually disappeared, so did the tourists who had formerly flocked to its once popular seaside resort area.[14]

The restoration project will create a beach area of 1.8 million square feet with a level berm 100 feet wide and 3 feet above mean sea level. The bayward slope will extend the shorefront to a total of 300 feet. Material for the base of the construction will be excavated from a borrow pit in Corpus Christi Bay, thereby providing a deep pool where fish can congregate

Beach restoration in progress at North Beach on Corpus Christi Bay late in June, 1977 (Photograph by Edgar R. Cobb, Jr.)

Dramatic beach erosion at Surfside is now being studied by the Corps. Note road washed out behind houses where beach has already disappeared.

during cold spells. Beach cover material is being obtained from a commercial sand source on the Nueces River. Periodic nourishment of the beach will be provided initially by the federal government and, after ten years, taken over by local interests.

A Delicate Balance

A bit of humor, attributed to the unlikely source of *Playboy* magazine, has recently enjoyed widespread popularity. Pointing up how pervasive national awareness of environmental concerns has become, the story consists of a conversation between God and Moses. The Lord tells Moses He has both good news and bad news for him. The good news, He tells Moses, is that plagues will smite the Egyptian oppressors, the Nile will turn to blood, frogs and locusts will cover the fields, gnats and flies will infest the Pharaoh's people, and hail and darkness will visit punishment upon the land of Egypt. "Then," promises the Lord, "I shall lead the children of Israel forth, parting the waters of the Red Sea so they may cross, and strewing the desert with manna so they may eat." Moses replies, "O Lord, that's wonderful; but tell me, what's the bad news?" And the Lord God responds, "It will be up to you, Moses, to write the environmental impact statement."[15]

In fact, the provision of the environmental impact statement (EIS) is no joking matter. Fulfilling this requirement entails considerable work for Galveston District personnel and guarantees consideration of factors that previously might not have been taken into account. Through the medium of the EIS, environmental quality takes its place beside engineering feasibility and economic efficiency as a prime criterion for future Corps projects.

When it was introduced, the EIS requirement created an awkward situation for previously authorized projects, some of which were well underway in 1970. In the Galveston District, several such projects — Wallisville Dam and Lake, a barge canal on Chocolate Bayou, and a flood-control and drainage project on Taylors Bayou — have been delayed by ramifications of the new procedure.

Wallisville serves to illustrate the difficulties that accompanied application of the National Environmental Policy Act to preauthorized projects. An obvious question asked whether the law should be applied to partially completed projects in the same manner as to future projects. Another issue revolved around the proper timing for evaluation of environmental impact. One court, addressing itself to this subject, declared that an EIS ". . . ought not to be modeled upon the works of Jules Verne or H. G. Wells."[16]

The Wallisville plan grew out of the almost century-old navigation project providing for a channel from Trinity Bay up to Liberty. The new, multipurpose project was designed primarily to prevent saltwater intrusion, a problem fostered by the navigation channel and particularly aggravated by drought. Salinity began damaging rice crops along the Trinity River during the 1950s and led to authorization for the Wallisville project in 1962.[17] Involving an earthen dam, reservoir, and navigation lock, the project would bar salt water from the river, thereby preserving the suitability of the river water for industrial, municipal, and agricultural uses. Furthermore, the water stored in the reservoir would increase the water supply for the well-populated, highly industrial adjacent area. The impounded waters would also benefit production of freshwater fish. Four parks located on the reservoir would provide recreational areas offering access to improved sport fishing and other water activities.

Begun in 1966, Wallisville construction was moving steadily along when the National Environmental Policy Act became law. Although guidelines were still formative and constantly changing, the Corps published the Wallisville EIS on December 13, 1971. Indicative of the extent to which the public has become embroiled in civil works during this decade, three environmental groups, a sportsmen's club, a commercial shrimp association, and two private citizens joined together in opposing the project. Taking their collective grievances to the federal district court in Houston, they obtained a decision enjoining the project, then 72 percent complete, on February 16, 1973.

The Wallisville case epitomized the monumental difficulties of satisfying multiple agencies and interests. The seven plaintiffs brought suit against the secretary of the army, the chief of engineers, and the Galveston District engineer. Listed as Defendants by Intervention were the Trinity River Authority, the cities of Houston, Fort Worth, and Dallas, and the Coastal Industrial Water Authority of Texas.[18]

The most salient objection to the project focused on that portion of the estuary above the dam where salty marshes, capable of supporting marine organisms, would be lost to freshwater storage. As this change would impair the saltwater habitat, decreased productivity of such valuable shellfish as brown and white shrimp and blue crabs as well as certain other species of fish would be anticipated.[19]

A circuit court of appeals at New Orleans reversed and remanded the district court decision on August 26, 1974. Meanwhile, Wallisville construction remains in abeyance until a supplemental EIS is submitted to the district court judge.

Although this brief discussion of Wallisville barely skims the surface of the many issues involved, it offers a sample of the enormous complexities — scientific, political, and legal — that must be overcome in integrating economic and environmental objectives.

Still another aspect of the National Environmental Policy Act that must be satisfied reaches beyond the limitations of the natural environment. The Corps of Engineers and other agencies engaged in civil construction must include in their environmental statements the anticipated impact upon cultural resources, especially archaeological and historic sites that may be affected by proposed projects. This entails not only initial reconnaissance to locate and identify potentially valuable sites, but also more intensive investigation to evaluate their significance and eligibility for preservation. Should they offer promise of adding to existing knowledge, they must be further scrutinized with a view toward future salvaging or preservation.

Within the Galveston District boundaries reside many clues to early habitation of the Texas coastal region. Ceramic, bone, and stone artifacts reveal cultural changes of the aboriginal Indian inhabitants and the apparently limited influence of their interaction with the Europeans who slowly arrived over the years after Cabeza de Vaca was cast ashore on Galveston Island in 1528. Shell and earth middens (refuse heaps) afford further insight into former life-styles by tracing the evolution of subsistence patterns.[20] Studies to assess the cultural impact of proposed projects have yielded a rich assortment of historic sites and archaeological artifacts, stimulating exploration and enhancing knowledge of these primitive societies.

Bicentennial awareness has heightened our sense of history and our appreciation of these cultural landmarks. Also, it has encouraged the Galveston army engineers to review their own role in the emergence of the Texas Gulf Coast. Their engineering accomplishments represent a vital contribution to development of this important part of the United States, a section blessed with valuable natural resources and offering tremendous residential, industrial, and recreational potential. The Galveston District has facilitated and supported regional growth, shouldering correspondingly greater responsibilities for improvement, maintenance, and protection within its boundaries.

Review of past achievements leads to reflection of the present and speculation as to what may lie ahead. Studies of superports 70 feet deep provide just one impressive indication of how significantly times, technology, and the coastal area have changed since the first improvements were undertaken by army engineers. The trend toward urbanization as this

region gains popularity may be expected to introduce another host of problems, disturbing the delicate balance between civilization and nature. Whatever challenges may arise, the men and women of the Galveston District can be expected to face the future with the same spirit of preparedness and ingenuity that has prevailed throughout their proud history.

Notes to Chapter 10

[1] 42 U.S.C.A. §§ 4331-4347 (1970).

[2] 33 U.S.C.A. §§ 401-418 (1970); Albert E. Cowdrey, "Pioneering Environmental Law: The Army Corps of Engineers and the Refuse Act," *Pacific Historical Review* 44 (August 1975): 341-43.

[3] Telephone interview with Glen Egan, September 1975; Cowdrey, "Pioneering Environmental Law," p. 344.

[4] Rivers and Harbors Act of March 3, 1899, 33 U.S.C.A. §§ 401-418 (1970); Exec. Order No. 11574 (1970); Engineer Regulation 1145-2-321 dated 7 April 1971; 33 U.S.C.A. § 1151 et seq. (1972); Permits for Activities in Navigable Waters or Ocean Waters 33 C.F.R. § 209.120 (1975).

[5] E. O. Gangstad, "Integrated Control of Alligator Weed and Water Hyacinth in Texas," in *Aquatic Plant Control Program, Technical Report 9* (Vicksburg: U.S. Army Engineer Waterways Experiment Station, 1975), p. 1; *Annual Report of the Chief of Engineers to the Secretary of War for the Year 1906* (Washington, D.C.: Government Printing Office, 1906), pp. 1324-25 (hereafter cited as *ARCE*, followed by date of fiscal year covered in report); Rivers and Harbors Act of March 3, 1905, ch. 1482, 33 Stat. 1117.

[6] *ARCE, 1908*, p. 1521.

[7] *Final Environmental Statement, Aquatic Plant Control and Eradication Program, State of Texas* (Galveston: Corps of Engineers, 1972), pp. 7-8.

[8] Gangstad, "Integrated Control," p. 1; *Final Environmental Statement*, pp. 1-3.

[9] *Final Environmental Statement*, pp. 3-6; Flood Control Act of October 27, 1965, Pub. L. No. 89-298, 79 Stat. 1073.

[10] *Galveston Daily News*, 27 August 1975.

[11] *Houston Post*, 10 August 1975.

[12] Rivers and Harbors Act of March 4, 1913, ch. 144, 37 Stat. 801; Rivers and Harbors Act of July 3, 1930, ch. 847, 46 Stat. 918.

[13] Rivers and Harbors Act of July 3, 1930, ch. 847, 46 Stat. 918; Act of August 13, 1946, ch. 960, 60 Stat. 1056; Act of July 28, 1956, ch. 768, 70 Stat. 702.

[14] Resolutions adopted by House Public Works Committee on 15 December 1970 and by Senate Public Works Committee on 17 December 1970 in accordance with section 201 of Flood Control Act of 1965; *Revised Final Environmental Statement, Corpus Christi Beach, Texas (Restoration Project)* (Galveston: Corps of Engineers, 1975), p. 7.

[15] *Houston Post*, 2 March 1975.

[16] Scientists' Institute for Public Information, Inc. v. Atomic Energy Commission, 481 F. 2d 1079 (D.C. Cir. 1973).

[17] Rivers and Harbors Act of October 23, 1962, Pub. L. No. 87-874, 76 Stat. 1173.

[18] Sierra Club v. Froehlke, 359 F. Supp. 1289 (S.D. Tex. 1973).

[19] *Ibid.*

[20] Kathleen Gilmore, *Cultural Variation on the Texas Coast: Analysis of an Aboriginal Shell Midden, Wallisville Reservoir, Texas*, Texas Archeological Survey, Research Report no. 44 (Austin: University of Texas, 1974), pp. ii, 1-6 ff.